

POWER TOOL OPERATION RECORDING AND PLAYBACK

RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Patent Application No. 62/220,627, filed on Sep. 18, 2015, the entire contents of which are hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to power tools, such as power drills or impact drivers.

SUMMARY

[0003] In one embodiment, the invention provides a method for operating power tools that includes receiving a command to start a recording mode at a first electronic processor of a first power tool, and receiving at the first electronic processor, a measured parameter from a sensor of the first power tool while a first motor of the first power tool is operating. The method also includes generating a recorded motor parameter by recording the measured parameter, on a first memory of the first power tool, when the first power tool operates in the recording mode, and transmitting, with a first transceiver of the first power tool, the recorded motor parameter. The method further includes receiving the recorded motor parameter at an external device, transmitting the recorded motor parameter to a second power tool via the external device, and receiving the recorded motor parameter via a second transceiver of the second power tool.

[0004] In another embodiment, the invention provides a power tool system that includes a first power tool, an external device, and a second power tool. The first power tool includes a first motor, a sensor coupled to the first motor and configured to measure a parameter of the first motor. The first power tool also includes a first electronic processor coupled to the first motor and the sensor, and a first transceiver coupled to the first electronic processor. The first electronic processor is configured to receive a command to start a recording mode, and generate a recorded motor parameter by recording the measured parameter while the first motor is operating and the first power tool is in the recording mode. The first transceiver is configured to transmit the recorded motor parameter to the external device. The external device is in communication with the first power tool, and includes a device transceiver. The device transceiver is configured to receive the recorded motor parameter from the first power tool, and transmit the recorded motor parameter to a second power tool. The second power tool is in communication with the external device, and includes a second transceiver and a second electronic processor. The second transceiver is configured to receive the recorded motor parameter from the external device. The second electronic processor is configured to store the recorded motor parameter.

[0005] In one embodiment, the invention provides a power tool including a motor, a sensor coupled to the motor, a transceiver, and an electronic processor. The sensor is configured to measure a parameter of the motor. The electronic processor is coupled to the motor, the sensor, and the transceiver, and is configured to receive, from an external device via the transceiver, a command to start a recording mode. The electronic processor is also configured to gener-

ate a recorded motor parameter by recording the measured parameter while the motor is operating and the power tool is in the recording mode, and transmit, via the transceiver, the recorded motor parameter to the external device.

[0006] In some instances, the power tool further includes a mode selector switch configured to receive a user mode selection, the user mode selection indicating an operating mode selected from a plurality of operating modes. In some instances, the processor is configured to receive the motor parameter from the external device as part of a tool profile; assign the tool profile to one mode of the plurality of operating modes rendering the one mode a playback mode; and operate the motor in accordance with the motor parameter when the mode selector switch indicates selection of the playback mode and upon receipt of an activation signal from a trigger of the power tool. In some instances, the motor parameter has a duration and, while the power tool is in the playback mode and the trigger is in the depressed state, the controller is configured to stop operating the motor based on the recorded motor parameter when the duration ends. In some instances, the motor parameter includes at least one selected from the group consisting of a duty cycle indicating trigger pull, a motor speed, a motor torque, a motor power, and a number of impact activations. In some instances, the processor is configured to begin to record the motor parameter for a predetermined time period upon at least one selected from the group consisting of entering the recording mode, receiving an activation signal from a trigger of the power tool, and receiving a start request from the external device. In some instances, the processor is configured to stop recording the motor parameter upon at least one selected from the group consisting of detecting a release of the trigger and receiving a stop request from the external device.

[0007] In another embodiment, the invention provides a method of operating a power tool including a motor, a communication controller, and a processor. The method includes forming a communication link between the communication controller of the power tool and an external device. The method also includes entering, by the processor, a recording mode based on a signal received from the external device over the communication link. The method further includes recording, by the processor, a motor parameter while the power tool is in the recording mode and the motor is operating to generate a recorded motor parameter. The method further includes transmitting, by the communication controller, the motor parameter recorded during operation of the power tool in the recording mode to the external device.

[0008] In some instances, the method includes receiving, by a mode selector switch of the power tool, a user mode selection. The user mode selection indicates an operating mode selected from a plurality of operating modes. In some instances, the method includes receiving, by the processor, the motor parameter from the external device as part of a tool profile; assigning the tool profile to one mode of the plurality of operating modes rendering the one mode a playback mode; and operating the motor in accordance with the motor parameter when the mode selector switch indicates selection of the playback mode and upon receipt of an activation signal from a trigger of the power tool. In some instances, the motor parameter has a duration and, while the power tool is in the playback mode and the trigger is in the depressed state, the controller is configured to stop operating the motor based on the recorded motor parameter when the